What is claimed is:

[Claim 1] 1. A pulse sequence to suppress background tissue, the pulse sequence comprising:

a slice selective pulse to spatially select an ROI for spin suppression;
a number of non-selective RF pulses played out after the slice selective pulse to suppress magnetization of static spins within the ROI; and
an imaging pulse played out after a number of non-selective RF pulses to excite inflowing spins to the ROI.

[Claim 2] 2. The pulse sequence of claim 1 wherein each of the number of non-selective RF pulses has an energy level less than that of the slice selective pulse and the imaging pulse.

[Claim 3] 3. The pulse sequence of claim 1 further comprising a crusher gradient pulse played out before the imaging pulse to de-phase residual transverse magnetization of spins outside the ROI.

[Claim 4] 4. The pulse sequence of claim 4 wherein the crusher gradient pulse dephases residual transverse magnetization at a slice orientation aligned with the spatially selected ROI.

[Claim 5] 5. The pulse sequence of claim 1 wherein the slice selection pulse has a flip angle of 90 degrees and the imaging pulse has a flip angle of 90 degrees.

[Claim 6] 6. The pulse sequence of claim 1 wherein the number of non-selective RF pulses includes pulse pairs.

[Claim 7] 7. The pulse sequence of claim 6 wherein the pulse pairs are applied along a plane of orientation transverse to the slice selective pulse.

[Claim 8] 8. The pulse sequence of claim 6 wherein the pulse pairs include a first non-selective pulse and a second non-selective pulse, and wherein the first non-selective pulse has a flip angle of +360 degrees and the second non-selective pulse has a flip angle of -360 degrees.

[Claim 9] 9. The pulse sequence of claim 1 wherein the number of non-selective RF pulses defines a spin lock pulse duration (TSL), and for angiographic contrast the TSL is shorter than that for perfusion imaging.

[Claim 10] 10. A method of MR flow imaging comprising the steps of:

selecting an ROI in which flow therein will be imaged;
applying a train of low energy RF pulses to suppress magnetization of spins in the ROI;
exciting longitudinal magnetization of inflowing spins in the ROI; and
acquiring MR data from the inflowing spins.

[Claim 11] 11. The method of claim 10 further comprising the step of applying a crusher gradient to reduce residual transverse magnetization of spins in the ROI prior to the step of exciting.

[Claim 12] 12. The method of claim 10 wherein the step of acquiring includes one of:

EPI readout; and
spiral readout.

[Claim 13] 13. The method of claim 10 wherein the step of selecting includes the step of applying a slice select gradient pulse and a slice select encoding RF pulse having a flip angle of 90 degrees.

[Claim 14] 14. The method of claim 10 wherein the step of applying includes the step of playing out a number of RF pulse pairs, one RF pulse of the pair having a +360 degree flip angle and the other RF pulse of the pair having a -360 degree flip angle.

[Claim 15] 15. The method of claim 14 further comprising the step of determining the number of RF pulse pairs based on whether an angiographic image acquisition or a perfusion image acquisition is to be carried out.

[Claim 16] 16. An MR apparatus to acquire angiographic or perfusion image data with background suppression, the MR apparatus comprising:

a magnetic resonance imaging (MRI) system having a plurality of gradient coils positioned about a bore of a magnet to impress a polarizing magnetic field and an RF transceiver system and an RF switch controlled by a pulse module to transmit RF signals to an RF coil assembly to acquire MR images; and

a computer programmed to apply a pulse sequence having:

a slice selective pulse to induce transverse magnetization in spins of a predefined static volume;

a series of non-selective pulses to suppress the transverse magnetization of the spins of the pre-defined static volume; and

an excitation pulse to induce transverse magnetization in inflowing spins to the predefined static volume.

[Claim 17] 17. The MR apparatus of claim 16 wherein the non-selective pulses are further defined to have an energy level less than that of the slice selective pulse.

[Claim 18] 18. The MR apparatus of claim 16 wherein the pulse sequence further has a crusher gradient pulse to reduce residual transverse magnetization of the spins of the predefined static volume before application of the excitation pulse.

[Claim 19] 19. The MR apparatus of claim 16 wherein the excitation pulse has a 90 degree flip angle.

[Claim 20] 20. The MR apparatus of claim 16 wherein the pulse sequence is further defined by a series of imaging pulses with echo planar readout.

[Claim 21] 21. The MR apparatus of claim 16 wherein the pulse sequence is further defined by a series of imaging pulses with spiral readout.

[Claim 22] 22. The MR apparatus of claim 16 wherein the series of non-selective RF pulses includes pulse pairs.

[Claim 23] 23. The MR apparatus of claim 22 wherein the pulse pairs includes a first non-selective pulse and a second non-selective pulse, and

wherein the first non-selective pulse has a flip angle of +360 degrees and the second non-selective pulse has a flip angle of -360 degrees.

[Claim 24] 24. A computer readable storage medium having a computer program stored thereon and representing a set of instructions that when executed by a computer causes the computer to:

apply a slice selective RF pulse and gradient to spatially define a volume for background suppression;

apply a train of non-selective RF pulses to lock spins in the volume; and

apply another slice selective RF pulse to excite longitudinal magnetization of inflowing spins to the volume.

[Claim 25] 25. The computer readable storage medium of claim 24 wherein the computer is further caused to apply an RF excitation pulse with echo planar or spiral readout.